CLAIMS:

1.   A method of writing an optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the method comprising the step of preventing a write operation to a portion of said second storage layer located below a maiden portion of said first storage layer.

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2.   A method according to claim 1, wherein writing to the second storage layer is prevented until the first storage layer has been completely written.

3.   A method according to claim 1, comprising the step of allowing a write

10   operation to a portion of the second storage layer if a sufficiently large portion of the first storage layer, overlying said second storage layer portion, has been written at least once, said portion of the first storage layer being smaller than the total first storage layer.

4.   A method according to claim 1, 2, or 3, wherein a write operation to a portion

15   of the second storage layer is prevented by defining said portion as being defective.

5.   A method according to claim 4, wherein a distinction is made between truly defective storage blocks and storage blocks which are merely temporarily defined as being defective..

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6.   A method of formatting an optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the method comprising the steps of:
—   defining logical disc addresses for logical blocks of the storage space;

25   —   defining a reserved storage space in the storage space;
—   defining a defect list and storing the defect list in a predetermined portion of the reserved storage space; and
—   incorporating into the defect list addresses of all blocks which are physically located in the second storage layer.

7.   A formatting method according to claim 6, also comprising the steps of:

— defining a defect type list and storing the defect type list in a predetermined portion of the storage space, preferably a portion of the reserved storage space; and

5   — writing into the defect type list, in respect of the blocks which are physically located in the second storage layer, a virtually defective code indicating that these blocks are only virtually defective.

8.   A formatting method according to claim 6 or 7, also comprising the steps of:

10 — writing disc address information regarding the relation between physical disc addresses and logical disc addresses into a predetermined portion of the reserved storage space.

9.   A multi-layered optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the disc

15 containing a defect list in a predetermined portion of a reserved storage space, the physical disc addresses of all blocks which are physically located in the second storage layer and which are located below a maiden portion of said first storage layer all being incorporated in said defect list.

20 10.   A multi-layered optical disc according to claim 9, also containing a defect type list in a predetermined portion of the storage space, wherein, in respect of those blocks which are physically located in the second storage layer and which are located below a maiden portion of said first storage layer, the defect type list contains a virtually defective code indicating that these blocks are only virtually defective.

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11.   A multi-layered optical disc according to claim 9 or 10, also containing disc address information regarding the relation between physical disc addresses and logical disc addresses in a predetermined portion of the reserved storage space.

30 12.   A disc drive system, capable of controlling a rotating means and a light beam generating means of an optical disc drive, suitable for writing a multi-layered optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the disc drive system being adapted to perform a formatting operation in accordance with any of the claims 6 to 8.

13.   A disc drive system, capable of controlling a rotating means and a light beam generating means of an optical disc drive, suitable for writing a multi-layered optical disc according to any one of the claims 9 to 11, the disc drive system being adapted to read the defect list from said disc and to communicate the defect list to a file system.

14.   A disc drive system according to claim 13, also adapted to read the defect type list from said disc and to communicate the defect type list to a file system.

15.   A disc drive system according to claim 13 or 14, further adapted to read the disc address information from said disc and to communicate the disc address information to a file system.

16.   A disc drive system according to any one of the claims 12 to 15, the system being adapted to check, after having written a maiden portion of said first storage layer, whether said first storage layer has been written completely, to maintain the defect list if said check reveals that said first storage layer has not yet been written completely and, alternatively, if said check reveals that said first storage layer has been written completely, to remove from said defect list all logical addresses of blocks which are physically located in said second storage layer.

17.   .   A disc drive system according to any one of the claims 12 to 15, the system being adapted, after having written a maiden portion of said first storage layer, to remove from said defect list physical disc addresses of blocks which are physically located in a portion of said second storage layer located below said written maiden portion of said first storage layer.

18.   A disc drive system according to claim 17, the system being adapted, when calculating which physical disc addresses are to be removed from said defect list, to take into account various properties of the disc and of a disc drive concerned.

19.   A disc drive system according to any one of the claims 16 to 18, adapted to read the defect type list from said disc, and also adapted, when determining which physical disc addresses are to be removed from said defect list, to take into account the codes stored in

the defect type list, such that blocks which are truly defective are maintained in the defect type list.

20.   A file system, designed for communicating with a disc drive system of an optical disc drive, and designed for handling the writing of user files to the disc and the reading of user files from the disc, the file system being provided with a memory and being adapted to receive from a disc drive system according to any one of the claims 14 to 19 a defect list and to store this defect list into said memory, the file system also being adapted to take the defect list into account when choosing logical disc addresses in response to a command to store a file.

21.   A file system according to claim 20, also adapted to receive from a disc drive system disc address information and to store this disc address information in said memory, the file system also being adapted to take the disc address information into account when choosing logical disc addresses in response to a command to store a file.

22.   A method according to any one of the claims 1 to 3, wherein a write operation to a portion of the second storage layer is prevented by defining said portion as being occupied.

23.   A method of formatting an optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the method comprising the steps of:
   —   defining logical disc addresses for logical blocks of the storage space;
   —   defining a reserved storage space in the storage space;
   —   defining a write history table and storing the write history table in a predetermined portion of the storage space, preferably in a predetermined portion of the reserved storage space, and
   —   writing into the write history table, in respect of all blocks of the storage space, a code having a first value indicating that these blocks are still maiden.

24.   A multi-layered optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the disc containing a write history table in a predetermined portion of the storage space, preferably in

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a predetermined portion of the reserved storage space, the write history table containing, in respect of the physical disc addresses of each block, at least of those blocks which are physically located in the first storage layer, a code having a first value in respect of blocks which are maiden and a second value in respect of blocks which have been written at least

5   once.

25.   A disc drive system, capable of controlling a rotating means and a light beam generating means of an optical disc drive, suitable for writing a multi-layered optical disc having a multi-layered storage space comprising at least a first storage layer and a second

10   storage layer below the first layer, the disc drive system being adapted to perform a formatting operation in accordance with claim 23.

26.   A disc drive system, capable of controlling a rotating means and a light beam generating means of an optical disc drive, suitable for writing a multi-layered optical disc

15   according to claim 24, the disc drive system being adapted to read the write history table from said disc and to store said write history table into a memory.

27.   A disc drive system according to claim 26, also adapted to communicate the write history table to a file system.

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28.   A disc drive system according to claim 26 or 27, the system being adapted, at least after having written a maiden portion of said first storage layer, to write into the write history table, in respect of all blocks which have been written in the writing operation, a code having a second value indicating that these blocks have been written at least once.

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29.   A file system, designed for communicating with a disc drive system of an optical disc drive, and for handling the writing of user files to the disc and the reading of user files from the disc, the file system being provided with a memory, being adapted to receive from a disc drive system according to claim 27 or 28 a write history table and to store this

30   write history table into said memory, and also being adapted to take the write history table into account when choosing logical disc addresses in response to a command to store a file.

30.   A file system according to claim 29, also being adapted to define a system file with a predetermined name, such that this system file occupies all logical addresses of blocks which are physically located in said second storage layer.

5   31.   A multi-layered optical disc having a multi-layered storage space comprising at least a first storage layer and a second storage layer below the first layer, the disc containing a file allocation list in a predetermined portion of a reserved storage space, the file allocation list containing at least one system file with a predetermined name, of which it is specified that it occupies all blocks which are physically located in the second storage layer

10   and are located below a maiden portion of said first storage layer.

32.   A file system according to claim 30, designed for handling the writing and the reading of user files to or from a disc according to claim 31, also adapted, after a write operation, to receive from the disc drive system the updated write history table and to update

15   the file allocation list accordingly with respect to said system file with a predetermined name, such that logical addresses of blocks which are physically located in a portion of said second storage layer located below said written maiden portion of said first storage layer are removed from said file allocation list.

20   33.   A method according to any one of the claims 1 to 3, comprising the steps of defining a write allowability table comprising in respect of each block, that is, at least in respect of the blocks physically located in the second storage layer, a code indicating whether or not it is allowed to write in such block, of setting the code to a first predetermined value in respect of those blocks in the second storage layer which are located below a maiden portion

25   of the first second storage layer, a write operation to a block being prevented if the corresponding code in the write allowability table has said first predetermined value.

34.   A method according to claim 33, wherein, after a maiden portion of said first storage layer has been written, in respect of those codes in the write allowability table which

30   correspond to blocks located below said written maiden portion of said first storage layer the value is set to a second predetermined value indicating that writing is now allowed.

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35.   A disc drive system according to any one of the claims 25 to 28, the disc drive system being adapted to calculate a write allowability table on the basis of the write history table, and to communicate said write allowability table to a file system.

5   36.   A file system, designed for communicating with a disc drive system of an optical disc drive and designed for handling the writing of user files to the disc and the reading of user files from the disc, the file system being provided with a memory and being adapted to receive from a disc drive system according to claim 35 a write allowability table and to store this write allowability table into said memory, and also being adapted to take the

10   write allowability table into account when choosing logical disc addresses in response to a command to store a file.

37.   A disc drive, suitable for writing a multi-layered optical disc, the disc drive comprising a disc system in accordance with any one of the claims 12 to 19, or 25 to 28, or

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